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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/735,840	12/16/2003	Takahisa Kikuchi	246683US90 CONT	5514

22850 7590 09/16/2004

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EXAMINER	
LAU, TUNG S	

ART UNIT	PAPER NUMBER
2863	

DATE MAILED: 09/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/735,840	KIKUCHI, TAKAHISA	
	Examiner	Art Unit	
	Tung S Lau	2863	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 December 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13 and 15-39* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *35-37* is/are allowed.

6)☒ Claim(s) *1-13,15-28,30-34,38 and 39* is/are rejected.

7)☒ Claim(s) *29* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *12-16-03*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. The IDS filed on 12-16-2003 has been accepted and signed by the examiner.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-13, 16-28, 30-34, 38, 39 are rejected under 35 U.S.C. 102(b) as being anticipated by Irie et al. (U.S. Patent 5,525,808).

Regarding claim 1:

Irie discloses an evaluation method that evaluates regularity and degree of a nonlinear distortion of a substrate, comprising: obtaining, for a plurality of divided areas on a substrate, position deviation amounts relative to predetermined reference positions by detecting respective marks, which are provided corresponding to said plurality of divided areas (abstract), fig. 1); and evaluating regularity and degree of a nonlinear distortion of said substrate by using an evaluation function that is used to obtain correlation (fig. 2, unit WS, PL), concerning at least direction, between a first vector representing said position deviation amount of a given divided area on said substrate and second vectors each of which represents said position deviation amount of a divided area of a plurality of divide areas around said given divided area (fig. 4).

Regarding claim 5:

Irie discloses a position detection method that detects pieces of position information to be used to align each of a plurality of divided areas on a substrate with respect to a predetermined point, said method comprising: calculating said piece of position information through use of a statistic computation using measured position information obtained by detecting said plurality of marks on said substrate (Col. 4-5, Lines 49-14), and determining for said piece of position information at least one of a correction value and a correction parameter that determines said correction value (Col. 6, Lines 9-25), by using a function that is used to obtain correlation, concerning at least direction, between a first vector representing a position deviation amount of a given divided area on said substrate and second vectors each of which represents a position deviation amount of a divided area of a plurality of divide areas around said given divided area, said position deviation amount of said first vector being relative to a predetermined reference position, said position deviation amounts of said second vectors being relative to respective predetermined reference positions (Col. 52, Lines 18-64, fig. 6, 7).

Regarding claim 13:

Irie discloses a position detection method that detects a piece of position information to be used to align each of a plurality of divided areas on a substrate with respect to a predetermined point (fig. 4), wherein, for a second or later (n'th) substrate of said plurality of substrates, so as to detect a piece of position

information of each of said plurality of divided areas of a plurality of substrates (fig. 6, 7), are used a linear component of a piece of position information of said divided area obtained by performing a statistic computation using measured position information in accord with position deviations of at least three specific divided areas relative to said predetermined point specified in design-position information (fig. 22, Col. 2, Lines 10-25), and a nonlinear component of a piece of position information of said divided area on at least one of substrates earlier than said n'th substrate, said measured position information being measured by detecting a plurality of marks on said n'th substrate (Col. 51, Lines 14-29), wherein said nonlinear component of a piece of position information of each of said divided areas is calculated based on a since complement function optimized based on indices of regularity and degree of a nonlinear distortions of at least one of substrates earlier than said n'th substrate (Col. 51, Lines 14-29). that are obtained by, through use of a predetermined evaluation function evaluation pieces of measured position information of said divided areas on said substrate. and based on a nonlinear component of a piece of position information of said divided area on at least one of substrates earlier than said n'th substrate (Col. 51, Lines 14-29, fig. 4, 9A, 9B).

Regarding claim 19:

Irie discloses a position detection method that detects a piece of position information to be used to align each of a plurality of divided areas on a substrate with respect to a predetermined point, said method comprising: grouping for a

second or later (n'th) substrate of a plurality of substrates, a plurality of divided areas on said substrate into blocks beforehand based on indices representing regularity and degree of a nonlinear distortion of at least one of substrates earlier than said n'th substrate so as to detect a piece of position information of each of said plurality of divided.areas of said plurality of substrates (Col. 51, Lines 14-29, fig. 4, 5,6, 7) said indices being obtained by evaluating, through use of a predetermined evaluation function, measured position information in accord with position deviations, relative to said predetermined point, of said divided areas on said at least one of substrates earlier than said n'th substrate (Col. 51, Lines 14-29, Col. 5, Lines 15-55); and determining said pieces of position information of al divided areas belonging to each of said blocks by using measured position information in accord with position deviations (fig. 10A-C), relative to said predetermined point, of a second number of divided areas, said second number being smaller than a first number, which represents a total number of divided areas belonging to each of said blocks.(fig. 16a, Col. 37, Lines 9-24).

Regarding claim 22:

Irie discloses a position detection method that detects a piece of position information to be used to align each of a plurality of divided areas on a substrate with respect to a predetermined point, said method comprising: determining a weight parameter for weighting (fig. 32), by using a function that is used to obtain correlation (fig. 31), concerning at least direction, between a first vector representing a position deviation amount of a given divided area on said

substrate and second vectors each representing a position deviation amount of a divided area of a plurality of divide areas around said given divided area (fig. 32), said position deviation amount of said first vector being relative to a predetermined reference position, said position deviation amounts of said second vectors being relative to said predetermined reference position (fig. 32), and weighting measured position information, obtained by detecting a plurality of marks on said substrate, by using said weight parameter and calculating said piece of position information by a statistic computation using said weighted, measured position information (Col. 5-6, Lines 15-25, fig. 33).

Regarding claim 25:

Irie discloses an exposure method that forms a predetermined pattern on each of a plurality of divided areas on a substrate by sequentially performing exposure of said plurality of divided areas on said substrate, said exposure method comprising: making, for each of at least two conditions concerning said substrate, beforehand at least a correction map based on measurement results of a plurality of marks on a specific substrate, said correction map being composed of pieces of correction information used to correct nonlinear components of position deviation amounts (fig. 22-24, Col. 37, Lines 9-51, Col. 51, Lines 14-29), relative to respective reference positions (fig. 27), of a plurality of divided areas on said substrate (fig. 26), selecting a correlation map corresponding to a designated condition before exposure (fig. 28); calculating pieces of position information used to align each divided area with respect to a predetermined point (fig. 28),

through use a statistic computation, based on measured position information obtained by detecting a plurality of marks provided corresponding to each of a plurality of specific divided areas on said substrate and performing (fig. 8-10C), after having moved said substrate based on said pieces of position information and said selected correction map exposure on said divided areas (Col. 82, Lines 43-63).

Regarding claim 31:

Irie discloses an exposure method that forms a predetermined pattern on each of a plurality of divided areas on a substrate by sequentially performing exposure of said plurality of divided areas on said substrate, said exposure method comprising: measuring pieces of position information of mark areas each corresponding to a respective mark by detecting a plurality of marks on a reference substrate; obtaining, by a statistic computation using said pieces of measured position information, pieces of calculated position information of said mark areas (Col. 5-6, Lines 1-58), each having a linear component of position deviation amount thereof, relative to a design value of a respective mark area, corrected (abstract); making a first correction map including pieces of correction information used to correct nonlinear components of position deviation amounts of said mark areas, based on said pieces of measured position information and said pieces of calculated position information, each of said position deviation amounts being relative to a design value of a respective mark area (fig. 6, 7), converting, before exposure, said first correction map to a second correction

map, based on information concerning a designated arrangement of divided areas (fig. 31-32), said second correction map including pieces of correction information used to correct nonlinear components of position deviation amounts of said divided areas, each of said position deviation amounts being relative to a reference position of a respective divided area of said divided areas (Col. 6, Lines 9-25); and calculating pieces of position information, used to align each divided area with respect to a predetermined point, through use of a statistic computation based on measured position information obtained by detecting a plurality of marks on said substrate and performing, while moving said substrate based on said pieces of position information and said second correction map, exposure on said divided areas (fig. 30B-32).

Regarding claim 38:

Irie discloses an exposure apparatus that forms a predetermined pattern on each divided area on a plurality of substrates by performing exposure on said substrates, said exposure apparatus comprising; a judgment unit of judging how large differences of overlay errors between a plurality of lots are, said lots including a lot to which a substrate subject to exposure belongs (abstract); a first controller that, when said judgment unit judges that differences of overlay errors between lots are large, upon exposure for each of a predetermined number of first and following substrates of said lot (Col. 5-6, Lines 1-59), calculates pieces of position information used to align each divided area with respect to a predetermined point, by a statistic computation using measured position

information obtained by detecting a plurality of marks on said substrate (Col. 4-5, Lines 49-14), calculates nonlinear components of position deviation amounts, relative to respective predetermined reference positions, of said divided areas by using said measured position information and a predetermined function, and moves said substrate based on said pieces of position information calculated and said nonlinear components (abstract), and upon exposure for each of the other substrates in said lot, calculates pieces of position information used to align each divided area with respect to a predetermined point, by a statistic computation using measured position information obtained by detecting a plurality of marks on said substrate, and moves said substrate based on said pieces of position information calculated and said nonlinear components calculated; and a second controller that, when said judgment unit judges that differences of overlay errors between lots are not large, upon exposure for each substrate of said lot, calculates pieces of position information used to align each divided area with respect to a predetermined point, by a statistic computation using measured position information obtained by detecting a plurality of marks on said substrate, and moves said substrate based on said pieces of position (fig. 22, Col. 2, Lines 10-25) information calculated and a correction map that is made beforehand and composed of pieces of correction information used to correct nonlinear components of position deviation amounts, relative to respective reference positions, of a plurality of divided areas on a substrate (Col.5-7 , Lines 1-64) .

Regarding claim 39:

Irie discloses an exposure method that forms a predetermined pattern on each of a plurality of divided areas on a substrate by performing exposure on said divided area, said exposure method comprising: selecting a first alignment mode, when, based on overlay error information of an exposure apparatus used in exposure of said substrate, errors between divided areas on said substrate are predominant (Col. 5-6, Lines 1-58), and a second alignment mode different from said first alignment mode, when errors between divided areas on said substrate are not predominate; and determining respective pieces of position information of said divided areas based on pieces of position information obtained by detecting a plurality of marks on said substrate using said selected alignment mode (Col. 1, Lines 15-65).

Regarding claim 2, Irie discloses evaluating using direction and size of vector (fig. 6, fig. 10a-c); Regarding claim 3, Irie discloses a correlation value is used (Col. 52, Lines 18-48); Regarding claim 4, Irie discloses average value of n vector area (Col. 24, Lines 34-57); Regarding claim 6, Irie discloses having linear component of the divide area (Col. 2, Lines 10-25); Regarding claim 7, Irie discloses a conversion equation to calculate position (equation 1, 2); Regarding claims 8, 32, Irie discloses the weighting amount of the divided area (fig. 32); Regarding claim 9, Irie discloses divided area in a coordinate system (fig. 4, 32); Regarding claim 10, 33, Irie discloses based on optimized function calculation (Col. 82-83, Lines 43-23); Regarding claims 11, 17, 20, 23, Irie discloses position

detection larger or equal to two and moved each area (Col. 51, Lines 14-35 ,fig. 4, Col. 71, Lines 43-61); Regarding claims 12, 18, 21, 24, 30, 34, Irie discloses use the process in lithography exposure (Col. 1, Lines 38-52); Regarding claim 16, Irie discloses weighting position information and statistic computation (fig. 32, Col. 5-6, Lines 56-8); Regarding claim 26, including two process (Col. 1, Lines 24-52), correction map of the area (Col. 6, Lines 9-25); Regarding claim 27, Irie discloses at least two conditions include at last two conditions concerning selection of said plurality of specific divided areas of which said marks are detected to obtain said measured position information, wherein upon said map making, position deviation amounts relative to respective reference positions of a plurality of divided areas on said specific substrate are obtained by detecting marks provided corresponding to each of said plurality of divided areas on said specific substrate (Col. 5-6, Lines 15-59) , wherein pieces of position information of said divided areas are calculated through use of a statistic computation using measured position information obtained by detecting marks corresponding to a plurality of specific divided areas that are corresponding to said condition and are on said specific substrate (Col. 4-5, Lines 49-14), for each of said conditions concerning selection of said specific divided areas, and wherein a correction map is made based on said pieces of position information and said position deviation amounts of said divided areas, said correction map being composed of pieces of correction information used to correct nonlinear components of position deviation amounts, relative to respective reference position, and said divided areas; and

wherein upon said selection, a correction map is selected that corresponds to designated selection information of specific divided areas (Col. 6, Lines 9-25). Regarding claim 28, Irie discloses use of a reference substrate (Col. 1, Lines 38-51).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

a. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Irie et al. (U.S. Patent 5,525,808) in view of Irie et al. (U.S. Patent 5,808,910).

Irie (U.S. Patent 5,525,808) discloses a method including the subject matter discussed above except the use of Fourier series, Irie (U.S. Patent 5,808,910) discloses the use of Fourier series (Col. 6, Lines 14-34), in order to have a high accuracy and high speed even sample has nonlinear error (Col. 3, Lines 20-24). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Irie (U.S. Patent 5,525,808) to have the use of Fourier series taught by Irie (U.S. Patent 5,808,910) in order to have a high accuracy and high speed even sample has nonlinear error.

Claim Objections

4. Claims 16, 17 are objected as these claims depend on claim 14, claim 14 was cancel by the applicant's Preliminary Amendment on 12-16-2003, from the claimed subject matter, the examiner assumes they are depend from claim 13, correction is required.

5. Claim 29 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all the limitation of the base claim and any intervening claims.

The following is an examiner's statement of reasons for allowance: prior art fail to teach based on Gauss distribution correction information.
Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Allowable Subject Matter

6. Claims 35-37 are allowed.

Reasons for Allowance

7. The following is an examiner's statement of reasons for allowance:

Independent claim 35 contains allowable subject matter. None of the prior art of record shows or fairly suggests the claimed invention.

Regarding claim 35:

The primary reason for the allowance of claim 35 is the inclusion of the method steps of a third exposure step of when in said first judgment step it has been judged that said errors between divided areas are not predominant, selecting an exposure apparatus capable of correcting distortion of said projected image and, with using said selected exposure apparatus, sequentially performing exposure on said plurality of divided areas of each of said plurality of substrates so as to form said pattern on each divided area. It is these features found in the claim, as they are claimed in the combination, that has not been found, taught or suggested by the prior art of record which makes this claim allowable over the prior art.

Claims 36 and 37 are allowed due to their dependency on claim 35.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tung S Lau whose telephone number is 571-272-2274. The examiner can normally be reached on M-F 9-5:30. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Barlow can be reached on 571-272-2269. The fax phone numbers for the organization where this application or proceeding is assigned is 703-872-9306

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

TL

MICHAEL NGHIEM
PRIMARY EXAMINER